

CHIPMAN (M. M.)

REPORT OF THE COMMITTEE

ON

MEDICAL TOPOGRAPHY, METEOROLOGY, ENDEMIC  
AND EPIDEMICS,

MADE TO THE

MEDICAL SOCIETY OF THE STATE OF CALIFORNIA,

AT THE ANNUAL SESSION, HELD AT SAN FRANCISCO, APRIL, 1881

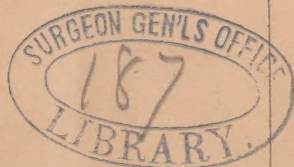
By M. M. CHIPMAN, M. D.,

OF SAN FRANCISCO, CHAIRMAN OF COMMITTEE.

*Subject:*

**Mining Debris Deposits.**

(Extracted from the Transactions of the Society.)



SAN FRANCISCO:

W. M. HINTON & COMPANY, PRINTERS, 536 CLAY STREET  
1881.



*With Compliments of the Author*



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BY M. M. CHIPMAN, M. D., CHAIRMAN.

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MR. PRESIDENT AND MEMBERS OF THE MEDICAL SOCIETY OF THE STATE OF CALIFORNIA: I believe in a beneficent Author of this beautiful world, with whom a thousand years are as one day, and one day as a thousand years; and I believe in a great future, when all the nations of the earth, of the past generations, of the present generation, and of the generations to come, shall mingle together in common intercourse, irrespective of the period at which each individual existed in flesh and blood, upon this earth. And there shall the true character of all men be known. And he who has spent his time here in the faithful performance of his duty to the Great Ruler, and in acts of kindness and deeds which inure to the benefit of his race, will be honored and loved of all men; and shall have the approbation and countenance of the Supreme Sovereign. But that he who has idled away his time, or has, in the indulgence of evil propensities, or by exclusive pursuit of self aggrandisement, wrought works which are detrimental, or injurious to his fellow-men, shall be cast out from association with the just, and from the presence of the Perfect One.

And when I saw, within the borders of our great State, which, because of unequalled climatic conditions, was intended as a sani-



tarium of our common country, and a choice abode of a numerous population, vast tracts of barren desert lands, which a few years since were covered with blooming gardens and richly laden fruit orchards, and inhabited by a prosperous and happy people; and when I learned that all the mountain streams of the west slope of our great Sierra had been seized upon, and converted into instruments of destruction, being made the bearers of devastating debris, which is rapidly burying and destroying the great valley which they were intended to fertilize and bless; then came to me the voices of multitudes of hungry men and of starving women and children, of the future generations; and the Great Common Father bade me: Go, as thou seest this great evil, and raise thy voice against it.

My attention was first specially directed to the subject of the mining debris deposits during a trip through the upper Sacramento valley, and a stop over for a few days at the city of Marysville; and I then determined to give it further investigation. Accordingly, I left San Francisco on the 8th of December, and taking with me a horse and buggy to facilitate the getting to all points wherever the investigation might lead, I repaired again to Marysville, and continued in the districts most subject to the deposit, occupying the time, although somewhat hindered and impeded by the unusual inclemency of the season, and the prevalence of flood during the latter part of the period, until the 14th of February, in examining the country, and in acquiring statistics and information in regard to these matters; in doing which I drove about the valley and somewhat into the mountains, as far northward as the location of the Spring Valley Mining Company's mines, at Cherokee Flat, above Oroville; and on my return as far southward as the Cosumnes River, some twenty miles below Sacramento.

Hydraulic mining is peculiarly an American invention, and an offspring of the discovery of the California gold mines; and from the most reliable available information, the year 1856 was about the date of its first having become so arranged and systematized as to assume importance as a distinct method of mining. After some advancement had been made in developing this system, the fact that the volume of water could not be increased beyond the ability of a man to sustain and manipulate the terminal end of the hose, in order to change, as required, the di-

rection of the nozzle, seemed to limit further progress, but in 1870 this obstacle was overcome by the invention of the chief. The chief is a heavy iron pipe or machine, which rests on the ground and receives the terminal end of the pipe, which conveys the descending stream from the reservoir. This machine is made with its nozzle orifice of diminished calibre, and the water being compressed, by the weight of the column, is thus forced through it with great velocity. And it also contains an internal arrangement, by means of which the water is projected from the nozzle in a compact stream; and the nozzle is so adjusted to it with joints that the direction of the stream can be changed by the operator with but little effort. Since this successful invention, the system has by degrees been improved, enlarged and extended, until hydraulic mining has assumed immense proportions. Water is carried long distances, at an outlay of large sums of money in the construction of ditches, and numerous engineering difficulties have been overcome in tunneling through mountain spurs and in crossing ravines and canyons by means of lumber flumes, some of which are a mile in length, and where the depression is too great for a flume to be supported with timbers, an iron pipe is laid, which conducts the water to the bottom, whence the pressure of the inflowing column forces it up the pipe to the grade of the ditch on the opposite side, where it resumes its course onward towards its destination. At the crossing of the Spring Valley Company's Cherokee ditch, from the east to the west bank of Feather river, the depth of the canyon makes it necessary that the pipe should sustain a pressure equal to a column of 887 feet in perpendicular height, 12,000 feet of 30-inch pipe being used to effect this crossing. The Miocene Company, of Butte county, has a ditch of the capacity of 3,000 inches of water, which has a flume suspended at 200 feet from the ground by iron brackets against a perpendicular cliff. Some of these ditches are over 50 miles in length, and there are iron pipes in connection with some of them of four feet in diameter. A ditch terminates in a reservoir, which is located on ground sufficiently elevated to usually give a fall of from two to three hundred feet to where the water is applied in the mine, and sometimes a greater head is obtained. The Spring Valley, the Miocene, and the Excelsior companies have about 300 feet each.

But the enterprising miner is not satisfied with the use of



water-power alone, but also adapts to his purpose the force of the most powerful explosives.

Running drifts, side drifts, and counter drifts, into a bank at distances of from fifty to three or four hundred feet below the natural surface, there is then placed within these narrow chambers whatever amount of blasting powder the conditions indicate can be used to the best advantage, perhaps ten tons, perhaps twenty tons, and even as much as 3,100 kegs, or thirty-eight tons and seven hundred and fifty pounds, have been used by the Excelsior Company at a single blast. And when the earthquake explosion has shaken up and loosened thousands of tons of earth, above and around it, then the mountain river which is reservoired in the artificial lake on the summit, is turned in perpendicular stream upon the half disintegrated bank. A thousand inches of water, with three hundred feet pressure, projected through an eight-inch nozzle, strikes with the force of a cannon ball, it burrows into the wall of earth, it recoils and runs off with rapid current, bearing its spoil of earth and pebbles on its way to the valley. The number of pipes used in each mine depends on the water supply, those having an abundance operate several at the same time.

This is briefly the gigantic process by which the superincumbent earth is washed from the gold-bearing gravel deposits, and from thence is carried on down to devastate and ruin the country below.

In the early settlement of Yuba county, the Yuba river was a stream of pure, clear water, running between banks of from eighteen to twenty-five feet in perpendicular height, with deep pools in its channel which were the abodes of food fishes, and the bottom lands on both banks were of unsurpassed fertility, and adaptability to gardening and fruit-raising.

In 1851, G. G. Briggs brought from the State of New York four hundred fruit trees and set them out on his ranch, situated three miles above Marysville, which was the first step toward fruit-raising in Northern California. Subsequently setting out additional trees from year to year, Mr. Briggs had raised and brought into bearing an extensive and very profitable orchard. Other settlers followed Mr. Briggs' example, and a considerable acreage was being cultivated in fruit. In 1858, Mr. Briggs first observed the deposit of debris in the river channel and on

its banks, in quantities to create apprehension in regard to its future effects upon the farming lands of the valley.

The winter of 1861 and '62 was a season of unusually heavy rainfall, and the inundation which resulted left a thick coating of debris in the Briggs orchard, and in other parts of the valley. Thereafter, each overflow added to the deposit, increasing the destruction of the orcharding and the injury to the ranches. But it was in the river channel that the work of destruction advanced steadily and unceasingly. First, the deep holes were invaded and filled up, then the whole river bed became gradually raised, until the channel was completely filled up and obliterated, and the water ran forth over the bottom lands, bearing its burden of debris, and depositing it everywhere in its course, to complete the final overthrow. Thus was destroyed one of the finest valleys in the State of California, and its inhabitants reduced to poverty, from comfort and affluence, were driven forth from their chosen homes, to seek a living wherever their ill starred fortunes might direct, and 15,200 acres of choice land, covered with valuable improvements, were converted into a plain of desolation.

The city of Marysville is situated on the north bank of the Yuba river, at its confluence with the Feather river. Originally the more elevated portions of the town site were above the reach of overflow, and as the lower part has been filled in and raised to the higher level, if the river channel had remained in its natural condition, the place would never have suffered from being flooded; but as the bed of the Yuba became raised and the channel of Feather river obstructed, the town became subject to inundation, which has caused much damage, besides being a source of heavy expense in building and keeping up levees for protection.

In the early settlement, the bank of the Yuba was cut down and graded at a point within about a mile of its mouth, to accommodate the steamboat business, and that continued to be the regular landing until the channel became obstructed with debris; since which time, the filling of the channel and the covering and filling up of the bottom land to the depth of from eight to fifteen feet, has raised the bed of the river twenty-eight feet, and to the level of the streets at the old landing, and higher at all points above. Formerly there was a sharp rise, or low bluff, of



from six to ten feet, separating the bottom from the adjacent upland, and as the river bed became raised, levees were constructed nearly on the line dividing the lowland from the upland, to confine the river within the area, which had already been destroyed. Since which, the process of deposit and elevation has continued, the height of the levees being increased as required, until the debris plain has become higher than the former high land on either side of it. During the low stage, the water covers only a narrow strip, but as high water approaches, it spreads out and occupies all of the broad space between its artificial banks, and in case a levee breaks, with the increased head acquired at flood time, the water is precipitated from its elevated plane upon the country below, with fearful and destructive force. These untoward circumstances, together with the exodus from the devastated lands, have occasioned a loss of population to the city, and a heavy depreciation in the value of real estate.

Bear river, another tributary of Feather river, with which it unites at about twelve miles below the mouth of the Yuba, is a somewhat smaller stream, but originally possessed the same characteristics as the last named, and in its course from the foothills passes through a body of land of like quality; and the history of this valley since the advent of debris would be but a repetition of the scenes of the other valley: the same invasion and devastation, followed by complete destruction, and the exodus of the population. Old settlers of the neighborhood of the destroyed lands furnish from memory a list of forty-two families in this valley who thus became victims, in the loss of their homes and property.

The valleys described were among the first invaded by the downflow of debris, but their destruction is but a small part of the damage which has been caused by it, and their area constitutes but a small proportion of the territory affected, which embraces all the principal tributaries of the Sacramento, including the tributaries of Feather river, which flow into those streams from the Sierra Nevada, within the Sacramento valley, and the bottom lands located on all of those tributaries, and to a great extent includes the channel and the bottom lands on both banks of the main river.

Evidence of damage is found as far north as Butte creek, in the southwest part of Butte county, in the filling in of its chan-



nel and by deposits on its adjacent bottom lands ; and at Oroville, which is located on Feather river, at its entrance into the valley, and at about seventy-five miles northward of Sacramento city.

Originally Feather river was a stream of clear water, with high banks, and holes, or pools, in the neighborhood of Oroville, of thirty and forty feet in depth ; and further down the low water occupation of the channel consisted of deep pools, or reaches, of several miles in length, alternating with short, shallow rapids. But these holes and reaches have become filled up with debris, and the bottom of the river raised to very nearly a common, even grade, on a plane higher than the former rapids, from Oroville to the mouth of the Yuba, a distance of thirty-seven miles by the river. The deposits above the last named point are mostly tailings of the mines of the neighborhood of Oroville.

State Engineer Hall, in his report to the Legislature at the session of 1880, states that the channel of Feather river had become filled in from bank to bank, at an average depth of eighteen feet, by the deposit at the junction of the Yuba. And from there the channel is filled nearly, and in places quite full, on down to its mouth, a distance of thirty miles; the low water plane of the river having been raised at the time of Mr. Hall's examination, at Oroville, from five to six feet; at the mouth of the Yuba river, from thirteen to fifteen feet; and at Nicolaus, from three to four feet. Before the filling in of the channel, the bottom lands of Feather river, except on the east side below the mouth of the Yuba, were above the high water mark of ordinary seasons, and therefore subject to overflow only during the seasons of extraordinary flooding, but since the filling in these lands rarely escape being flooded once or twice every year; and the obstruction to drainage and the natural outflow of the water, so prolongs the period of inundation, and keeps the land soaked and overmoist for such a length of time as to have destroyed the greater part of the orcharding, and render all the bottom lands of this river, from twelve miles below Oroville to its mouth, either entirely unproductive and valueless, or much damaged thereby—besides much damage has been done above the mouth of the Yuba, and thousands of acres permanently ruined below that point by the deposit of debris.

The channel of the Sacramento river has been filled in from

the mouth of Feather river, to some distance below Sacramento city, to a great extent. The deep holes, or reaches of deep water, have been filled up, and the shoal places made more shallow, and a general raising of the river bed, and elevation of the low water plane has taken place. At and just below the mouth of the American river, Mr. Hall ascertained by comparison with a survey made by the direction of the Sacramento City Council, in 1854 that the maximum filling was thirty feet, and that the average fill across the channel was fifteen feet and two inches.

- From Freeport, twelve miles below Sacramento, to the head of Grand Island, the filling in had been less, yet enough to noticeably raise the river bed and the plane of low water. Mr. Hall estimated the elevation of the low water plane above the original level, to be at the head of Grand Island, from one and a half to two and a half feet; at Sacramento, from five to five and a half feet; at the mouth of Feather river, from three to four feet; and at Knight's Landing, in consequence of the backing up of the water from the filling at the mouth of Feather river, from one to one and a half feet. Sloughs of the river, or subsidiary channels, which formerly received its surplus as the water approached the higher stage, and thereby greatly added to its carrying capacity, have also been very much filled in, and Steamboat slough, the channel on the north side of Grand Island, and which was formerly navigable for large steamboats at all seasons, has become nearly obliterated.

The bottom lands of the Sacramento have, in some localities, received permanent damage by the deposit of debris; but the process which has ruined its tributaries and their adjacent bottom lands, has not yet advanced to the same stage in the main river, and the injury at present proceeds more from the increased, more frequent, and prolonged flooding, caused by the unfavorable changes in the river channel.

In Placer county, along Coon creek and Auburn ravine, considerable tracts of fertile lands have been devastated. In Sacramento county, the former very productive valley of the American river has been nearly destroyed; and the fertile bottom lands of the Cosumnes have been in part destroyed, and the balance much damaged. The lands of Mokelumne river have sustained damage, but to a less extent.

I have collected statistics of area, and estimates of the losses

of the greater portion of the destroyed and injured lands in that part of the Sacramento valley lying east of the Sacramento river, and north of Sacramento city, including the American valley, and also of the Cosumnes bottom lands, and of the destruction of real estate improvements, so far as I was able to obtain authentic account, and of personal property to a limited extent; getting my data and estimates in part from Mr. Hall's report and from county records, and in part from the statements of intelligent and reliable resident citizens who have an intimate knowledge of the facts and circumstances.

On the Yuba river 14,100 acres of bottom lands have been covered with debris from eight to fifteen feet in depth, the estimated loss being \$1,906,200. And outside of the levee and east of Marysville 1,120 acres of the higher land have been so covered with debris, in consequence of the breaking of the levee, as to cause damage and depreciation in value amounting to \$61,600.

George Ohleyer, Esq., who was intimately acquainted with the condition and improvements in Yuba valley, testified before the Legislative Committee on Mining Debris, of the session of 1877-78, that the losses sustained by the settlers upon these tracts of land, in the destruction of buildings, fences, orcharding and other property, would amount in the aggregate to from \$1,500,000 to \$2,000,000. Not wishing to exceed the most conservative estimate, I have adopted the lowest figure.

In 1875 the Yuba river broke its levee and inundated Marysville so suddenly that the surprised inhabitants had barely time to escape with their lives, leaving their effects to be destroyed. The loss, at that time, in household furniture, implements, merchandise of various kinds, hay, grain, fuel, etc., as then estimated by C. E. Sexa, Esq., amounted to \$600,000. From 1860 to 1880, the city records show a depreciation in the valuation of lands, within the city, and of real estate improvements, of \$918,464. This is much less than the actual damage and depreciation which the real estate of this city has sustained on account of the debris encroachment upon itself directly, and from the enforced depopulation of the neighboring country, but having no means of arriving at a full estimate, I shall adopt these figures.

On Bear river 8,800 acres of bottom lands have been destroyed, the loss being \$875,600, and by a carefully prepared estimate of



Messrs. J. M. C. Jasper and Charles Justis, real estate improvements of the value of \$96,400 were destroyed with the land. Along Feather river, from Marysville to Shanghai Bend, a distance of two and one-fourth miles, 1,470 acres of land have been covered with debris, to such a depth as to destroy it, the loss being \$146,265. In Yuba county, on Feather river, below Shanghai Bend, 5,476 acres of land have been damaged and depreciated in value in the aggregate of \$125,820. Above Marysville, along Feather river, extending to the Butte county line, 4,000 acres of bottom lands have been nearly ruined, and have sustained damage and depreciation in value, as per estimate of Messrs James Strain and J. J. Shandon, to the amount of \$260,000, and on this last tract, orcharding of the value of \$20,000 has been destroyed.

The total amount of destruction and damage to property in Yuba county, of which I was able to obtain authentic account, amounts to \$6,547,849.

T. B. Hutchins states, that on Honcut creek, in Butte county, 1,500 acres of land have sustained damage to the amount of \$37,500; and that along the east bank of Feather river, above Honcut creek, 3,750 acres of land have sustained damage to the amount of \$112,500.

From statements of Messrs. Robert Turner and A. W. Campbell, I learned that on the west bank of Feather river, in Butte county, 685 acres of bottom lands have been much injured and depreciated in value, to the amount of \$20,550.

The total damage by debris, and from its effects, in Butte county, of which I was able to obtain definite estimates, amounts to \$170,550.

Sutter county, which originally contained more fine agricultural land in proportion to its total area than any other county in the State, from its exposed situation, and particularly on account of the filling in of the channel of Feather river, has been a great sufferer, having sustained damage and depreciation to the extent that the total valuation of real estate in the county, at the present time, is not one half what it would have been without this invasion of the offal of the hydraulic mines.

B. F. Walton, Esq., with the assistance of other responsible gentlemen of that county, has made the following estimates: Along the west bank of Feather river, in Sutter county, 11,520

acres of rich bottom land have been covered with debris, and rendered valueless, the loss of which amounts to \$1,152,000; and on this tract, orcharding which belonged to the estate of the late J. G. Briggs, of the value of \$50,000, has been destroyed. And on account of the exposure to the overflow of Feather river, and the heavy rates of taxation incurred in efforts for protection by leveeing, and the general apprehension that the bed of the river will soon become raised so high that the water will altogether leave its channel and spread out over these lands, with its debris to complete their destruction, all the higher or second bottom lands, situated between the bottom lands of Feather river and the bottom lands of the Sacramento, in Sutter county, and which under ordinary circumstances would be well worth \$60 per acre, will hardly sell at present for from \$15 to \$30 per acre. The area of land thus situated embraces 138,880 acres, and at \$30 per acre the depreciation of this tract amounts to \$4,166,400. This last tract, unlike the bottom lands, has not yet received much permanent injury, and could the downflow of debris be stopped, so that the river bed would not be raised still higher, this land could be protected and would appreciate in value again, but the apprehension is that relief will come too late and that the whole tract will be permanently destroyed.

Along the east bank of the Sacramento, in Sutter county, is a large tract of formerly very productive alluvial land, but now rendered almost worthless on account of the partial damming of the river by the deposit at the mouth of Feather river. Colonel Wm. Rackaby estimates the area of this tract at 15,360 acres, and the aggregate depreciation in value at \$691,200.

Phillip E. Drescher, Esq., of Nicolaus, makes the following statement in regard to the destruction and damage to lands on the east side of Feather river, in Sutter county: One tract of 500 acres has become buried up in debris and completely destroyed, the loss being \$15,000; and 51,840 acres have sustained damage, causing an aggregate depreciation in value of \$724,800.

The total loss, damage and depreciation in values, in Sutter county, so far as I was able to obtain account and reliable estimate of, amount to \$6,799,400.

Along Auburn ravine and Roseville creek, situated in Placer and in Sacramento counties, Mr. Hall, in his report, states that

2,480 acres of land have sustained damage and depreciation in value, amounting to \$86,800.

Hugh M. Larue, Esq., made the following statement of damage to lands and destruction of property in Sacramento county: On the east bank of Sacramento river, from the mouth of American river to the Sutter county line, 3,840 acres of formerly excellent garden and fruit land have been rendered nearly valueless; the damage and depreciation amounting to \$537,600. That lying immediately back of the above mentioned strip is a belt of 23,040 acres of formerly excellent pasture land, which has been damaged to the amount of \$138,240.

Mr. Larue also states, that along the north bank of the American river, 3,000 acres of very rich alluvial land have been nearly destroyed by deposits of debris, the damage and depreciation in value of which he estimates at \$280,000, and that orchards, vineyards and buildings, have been destroyed on the last named tract, of the value of \$41,000.

At the mouth of American river, on the south side, between the city levee and the river, was formerly a tract of 900 acres, which was very productive in fruits and garden stuff, and which was divided into eighteen holdings, and had located upon it sixteen resident families, each of which received a considerable income from this landed property. But A. S. Greenlaw, Esq., one of the four proprietors who are still striving to retain their residences there, states that 200 acres have been destroyed, entailing a loss of \$60,000, and the other 700 acres have become nearly valueless; the estimated damage and depreciation being \$189,000. On this tract, orchards and buildings have been destroyed to the value of \$95,000.

On the south bank of the American, above Sacramento city, Dr. W. S. Manlove states that 900 acres of alluvial land have been destroyed, of the value of \$135,000, and 3,580 acres have sustained damage and depreciation to the amount of \$268,500. And on these tracts, orchards, vineyards and buildings, including Smith's orchard, which was one of the most valuable in the State, have been destroyed, to the amount of \$135,000.

From the statements of Messrs. Charles Pierce and D. H. Cameron, I have compiled the following estimate of loss and damage to lands along the Cosumnes river: There are the equivalent of twenty sections, or 12,800 acres, which have been



subject to the debris deposit; of which 2,560 acres have been completely destroyed, and the balance, 10,240 acres, have been badly damaged. The loss of the destroyed lands is estimated at \$153,600, and the depreciation in value of the damaged lands amounts to \$307,200.

The total amount of destruction and damage, which I was able to obtain account of, in Sacramento county, caused by debris deposits, not including the damage to lands on Roseville creek, aggregates \$2,340,140.

The total destruction of lands and property, and damage to lands, in that part of the Sacramento valley of which I made examination, so far as I was able to obtain account and arrive at estimates of, amount to \$15,944,739; there having been 40,050 acres of the richest and most valuable fruit and garden lands in the State completely destroyed, and 270,991 acres of other valuable lands which have sustained great damage and depreciation in value. In fact, considerable tracts of the land classed as damaged, are so nearly destroyed as to possess at present only a nominal value.

But the losses and damages of which I was able to obtain a sufficiently definite account to form equivalent money estimates of, are comparatively a small proportion of the actual damage already caused by this immense outflow of mining debris; and I will now point out, briefly, some of the losses and injuries sustained, of which no account has been taken, and other damages, which are inestimable. Of the extent of the deposits on Butte creek, I was unable to obtain an authentic account, and I was informed of damaging deposits on the Sacramento bottom lands, in Yolo county, and also in Sacramento county below Sacramento city, which I was prevented from examining, or getting definite account of, because of the prevalence of flood at the time which I had devoted to the purpose.

And there is an area of several thousand acres of land, in the southern part of Butte county, which has sustained damage and depreciation from the same cause which affects the second bottom lands adjoining in Sutter county, but not to an equal degree.

State Engineer Hall, in his report to the Legislature, at the session for 1880, states as follows: "A study of this subject has led me to the conclusion that by the raising of their beds, the

Feather and Sacramento rivers below the mouth of the Feather, have been diminished in carrying capacity, on an average, about thirty per cent of their former ability to pass flood waters between their natural banks, and that, at points, the capacity has been reduced as much as fifty per cent; so that could these rivers have been brought to one uniform capacity, before the extraordinary filling commenced—that is, could the bars and bad bends have been taken out then, as they could have been at a comparatively small expense by a proper treatment—the whole channel would have been of double the capacity it is to-day, and would have remained at that, or have become still greater if the flow of sand had not come.”

Here we have direct evidence, that the statements regarding the flooding of the Sacramento valley for the past twenty years has been constantly increasing, in the several respects of frequency, extent of area, and in the prolonged duration of each overflow, must be correct; and it is not possible but that this increased flooding should produce disastrous effects upon the farming interests involved. Although that part of the valley which I examined, has received the greatest proportionate amount of damage, yet in the greater area which I was unable to visit at this time, there have been thousands of acres of orchards destroyed, and there are extensive tracts of lands, which were formerly cultivated with success and profit, which latterly have been abandoned as farming lands, because of these encroaching changes, of which no estimate has been made. And the thousands of acres of crops, which in consequence of this thing have been repeatedly destroyed, the immense quantities of fencing which have been displaced and destroyed, the number of buildings which have been wrecked and swept away, the live stock and other property that has been destroyed, of all these great losses there has been no record kept. And although we are unable to ascertain in respect to the damages from flooding, the difference between the immense losses which have actually taken place from time to time, and the amount of damage which might have occurred had the natural channels remained as formerly, yet taking together the evidence of history, statements of the resident population, and the facts of scientific investigation, there can be no doubt but that by far the greater part of the temporary damage, and all the more permanent, is

justly chargeable to the destructive agency of hydraulic mining.

Immense sums have been expended in efforts for protection, by levee building; Sutter county alone having spent over \$2,000,000 for that purpose, as per statement taken from the records of the county by the County Clerk, W. H. Lee. The first levees were built above the high water level of previous floods, but in a short period thereafter, the dropping debris had raised a platform, and so obstructed the outflow that the water, rising higher than ever before, overtopped and carried away the levees and flooded the farms to an unprecedented depth.

Again the ranchers tried this same line of defense, building higher, broader and stronger, but this never resting agent of devastation kept on with its filling in and building up, and when the next great flood came, its interposing barriers were more numerous, and its stairway reached higher than before, and the poor farmer saw his hope of protection, on which he had toiled and expended his savings, overcome again, and the murky deluge rush on over his lands, carrying destruction with it, and leaving blighted and devastated fields after it. And this same procedure has been repeated over and over again, until many of the ranchers, having got heavily into debt through their misfortunes, have become discouraged, and now manage to get along with as little expenditure of money for improvements as possible, indulging a faint hope of a change for the better, but with more apprehension of the final complete destruction of their half ruined ranches. This is the situation, not of the destroyed lands, but of extensive districts which are awaiting the termination of the process, by which, on the streams first invaded, more than 40,000 acres have already been hopelessly buried.

Although the cities of Marysville and Sacramento have met with better success, having, on account of the great amount of property concentrated within comparatively limited area, by means of proportionate outlay in levee building, with a few exceptional instances, been able to protect themselves from overflow, yet this has been accomplished only through great watchfulness and burdensome expenditure of money. Had there been no mining tailings sent down from the mountains, no leveeing would have been required at Marysville, and only a low and inexpensive levee at Sacramento, and very little levee-



ing for protection elsewhere in the valley, and therefore nearly all the great expenditures for those purposes have been caused by the debris invasion.

It is well known that the navigation of the Sacramento, and its tributaries, is not only a convenience and advantage of itself, but that it also serves as a regulator of the rates, so far as it extends, of the railroad companies, and that too, without trouble or expense to the State—that wherever this natural competition exists the prices of passenger fares and of freights are materially less than in other parts of the State, and yet the navigable capacity of the main channel has already been so much diminished, that, whereas fifteen years ago, between San Francisco and Sacramento, one thousand ton steamers were suitable for any stage of water, at present vessels of half that capacity meet with more difficulty than did the large class before the filling in had taken place. And there are sloughs of the river, which were formerly made use of for the shipment of farm produce, with great saving of expense to the farmers of adjacent lands, the navigability of which have been destroyed. And Feather river, in its natural condition, could have been so improved, with but little expense, as to have been a good navigable stream for small steamers during the entire year, as far as Oroville, but that opportunity has been destroyed.

Some years since, by the union of capital and enterprise, several islands of the Sacramento were leveed, and great quantities of produce were being shipped from them to the San Francisco market. The prospect of profit from these investments was encouraging, reclamation schemes were the order of the day, and plans were being devised for a general system whereby the whole area of our extensive tule lands might be reclaimed. But repeated overtopping of levees and devastation of the lands which had been reclaimed followed, ruining some of the people who had already invested, and discouraging all others; and reclamation became a thing of the past. I am not able to state to what extent reclamation might have proved successful otherwise, yet as the deposits were there to increase the elevation of the waters, and as a dammed stream will always rise above its obstructions, these must have been a factor in the causes which produced the disastrous results. And as the river channels are the only outlets of the tule lands, steps in the direction of

drainage appear to be inconsistent while this process of filling in is allowed to continue, and it would now require an immense outlay to remove the obstacles which this deposit has added to the difficulties of accomplishing the reclamation and much desired addition of these fertile lands to the agricultural resources of the State.

The destruction of the tributaries, and the injury to the Sacramento itself, as sources of fish supply, is much to be regretted; and especially in consideration of the recent very useful discoveries in the art of propagation of edible fishes, is a serious loss to the food resources of the State. And the changing the former pure and wholesome character of the waters of all these streams into their present very muddy and unsightly condition, is a great inconvenience, and more or less a cause of expense to the districts which they should naturally supply, the waters of the tributaries being rendered entirely unfit for any use, and, although the Sacramento water is very turbid and unfit, yet the inhabitants of Sacramento city are obliged to use it, for the reason that all other available sources of water supply are corrupted from this same cause.

The enlarged area of submerged lands, and the obstruction to drainage, greatly tend to increase the extent and frequency of malarial disorders; and physicians of experience in the affected districts state that the fresh deposit itself contains a principle which engenders disease that partakes of the typhoid character, and is much more difficult to manage, and more liable to a fatal termination than the simple malarious fever which prevailed before the advent of debris. And in the cities of Marysville and Sacramento the water level has been so much raised on the outside of the city levees, as to obstruct the drainage and discharge of sewage during a long period of each year, which adds another serious evil to the many imposed by these deposits.

I have now presented a brief outline of the losses and damage to the material interests of the State, by this unexampled condition of things; and the facts given, show that the vast area of country on which the profits of farming have been offset by repeated destruction of crops, or which have been rendered unproductive, of which I have made no estimate, the widespread losses from time to time, of which no account can be obtained, and the inestimable injuries to which I dared not venture the application

of figures, amount to many times more than my calculated estimates; and even to more than all the gold that has ever been taken out by this destructive process of mining.

G. G. Briggs, who has had three fine orchards destroyed in succession, on the Yuba, Feather and Sacramento rivers, and who has had ample opportunity to observe its ruinous progress and study its results, expresses the opinion that the mining debris has damaged the State of California more than \$500,000,000; and it is certain that even that large sum would not suffice to compensate for all the property it has destroyed, and gather up the mountains' bulk of incumbering debris from off our fertile valleys and out of the channels of our once beautiful rivers, and transport it off to where it would be as much out of the way as it was back in its long time resting place; and no power on earth can cancel the impoverishment and privation its victims have endured, the disease and misery it has already inflicted, or restore the desolate homes it has broken up and destroyed.

And now, having considered the damages already sustained, let us examine the results which must follow, provided this process is allowed to continue.

Mr. Hall, in his report, estimates that it will take thirty years to work out the hydraulic mines at the present rate of mining, and G. F. Allardt, C. E., who has made a detailed survey of the main Yuba river, and of its north, south and middle branches, estimates that it will take forty years. Now, when we consider the progress thus far, and that the experience and skill acquired, and the appliances now in use, are such that the rate of mining and displacement of earth is immensely greater at present, and will continue to be in the future, than it has been in the past, we can come to no other conclusion but that total and complete devastation must inevitably follow. Feather river will soon be permanently forced from its channel, and the same will result the Sacramento at no distant time. The lands lying along the Feather river which have not already been destroyed, and the second bottom lands of Sutter county, will, in a short time, become as valueless as the debris plain of Yuba valley; and long before this lease to ruin shall have expired, and the miners have washed out the last gravel deposit, the main valley will have been converted into alternate tracts of debris desert and sand marsh, and all the most productive portions of the whole valle



will have become depopulated. Marysville will become untenable and tenantless, and if Sacramento manages to keep out the flood waters and save its streets and buildings by reason of its greater property interests, it will necessarily go into a decline in sympathy with the surrounding desolation. And as to our commercial metropolis : A hundred thousand acres of the best land in California have already ceased to furnish tribute to its markets, or to support customers for its merchandise and the products of its manufactories; and the producing capacity of a much larger area has been materially diminished, and the business of the city must sympathize with and will continue to be affected by the prosperity or decadence of its supporting country. And although the slickens which remain in suspension in the Sacramento, and accompanies it into and in part through the bay, has as yet produced no perceptible effect in diminishing the capacity of the harbor, yet the heavier debris is busy in preparing itself a way. As long as there are holes in the river channel the sand will deposit in the holes, but the holes are rapidly filling, and when the grade which has been completed in the Yuba to its mouth, and from thence to the mouth of Feather river, shall have been finished in the Sacramento, and extended on, and Suisun and San Pablo bays have become filled and leveled up, then the current will push the debris on over the smooth surface into San Francisco bay. Could the outflow of debris be arrested at once, no great damage would result to the harbor from what has already found lodgment in the uneven bottom of the river channel; but if allowed to continue, just as certainly as the sands from ten times the distance on the upper Missouri are carried down and obstruct the entrance to the Mississippi, just so surely will the debris of the hydraulic mines fill in San Francisco harbor, and obstruct the entrance at the Golden Gate. And although it might be possible to compel the miners to keep their tailings out of the streams whenever the shoaling of the harbor commences, yet there would then be enough on the way down to cause great and irreparable injury to the shipping interests of the city and State.

#### THE ONLY REMEDY.

Colonel Mendell, in his testimony before the Legislative Committee of 1877-78, said : "That a man who is not an engineer might understand the subject of mining debris, provided he had

been accustomed to deal with it, and an engineer might not understand it, in case his attention had not been directed to it " In fact, it is a subject to which mathematics is not applicable, in all respects, and in which experience and opportunities of observation are worth more, in some respects, than engineering science. Captain Eads, who has acquired a great reputation as a successful engineer, failed in his very brief visit to the mining districts to arrive at an understanding of the situation, and suggested a measure which experienced hydraulic miners at once pronounced futile ; and some of them predicted before the dams were tested the exact manner of their failure.

For a period of six weeks during the rainy season, I made frequent visits to the Yuba brush dam and watched the effect of that experiment, and the fact is that notwithstanding the deposit of debris above the dam, the water was deprived of so small a proportion of its solid matter by the single obstruction as to produce no visible change in its appearance or to divest it of its power for damaging the country over which it was subsequently to flow to any appreciable extent.

Engineer Allardt, in testifying as an expert in the case of Keyes vs. Hydraulic Mining Companies of Bear river, stated that, in his opinion, to settle and make clear water of that stream while the mines are in operation, would require 100 dams ; which dams would fill up in two years time, and others would have to be constructed to perform the duty. Although Mr. Allardt admits that a less number would do, by building higher than those which he then contemplated, yet every one who is acquainted with those matters knows that it would require a number of dams in succession, on the same stream, to divest the water of its debris. And with the experience already gained in the way of dam construction during the past year, it is apparent that dams in sufficient number and of sufficient capacity and stability, would cost an immense amount of money, and more than is possible to raise for that purpose. Therefore, all projects of impounding the debris by means of dams across the rivers, are utterly impracticable, and the men who advocate the employment of such measures are like the physician who prescribes the soothing anodyne, or the deceptive placebo, whilst the deadly malady runs its course.

There is one measure only which will put a stop to this destruction of the Sacramento valley and arrest the threatened ruin of San Francisco harbor, and that is to wrest from the hydraulic

miners the exclusive privileges which they assume, and which they have hitherto been allowed to enjoy, and compel them, in a cordance with the law which prevails elsewhere in all civilized parts of the world, and in this State is applied to all other classes of citizens, and to every other industry, to so manage their property as not to destroy or to cause injury to the property of other people.

Geographers estimate the entire area of the earth's surface at  $196\frac{1}{2}$  millions of square miles, of which 146 millions, or nearly three-fourths, consists of water; and after deducting from the remaining  $50\frac{1}{2}$  millions of square miles, the uninhabitable arctic regions, the unproductive deserts and rugged mountains, there is left but comparatively a small area which will repay the tillage of the husbandman. And as the earlier civilized parts of the world have already become fully populated, and some of the older countries overpopulated, to the extent that thousands, and sometimes millions, perish annually from lack of subsistence, it is therefore obligatory upon all nations, and especially upon the enlightened, to preserve carefully their productive territory; for if we are not able to send of our surplus to the suffering poor of those distant countries, or if they are not able to come and occupy of our abundance, the acreage which we do not need for our immediate wants, but a few generations hence, our own State, with its mild and healthful climate, will teem with its millions of human beings burdened with the same wants and necessities, endowed with the same capabilities of enjoyment, and affected with the same susceptibilities of suffering and grief as ourselves. To the statesman, then, I would say: Here is a matter worthy of your earnest attention and most solicitous consideration. To the philosopher and evolutionist: Here is an opportunity to array yourself in support of the beneficent processes of nature, and to discountenance this ruthless war upon her sacred works. To the Christian: Here, within our own borders, is a sect who worship and obey the behests of a god which is more destructive than Moloch of the valley of Hinnom. Is it not your duty to arrest the progress of this heathenism? And to all patriotic citizens, and to every philanthropist, of whatever creed or belief: Here is a service to perform—a labor of love in behalf of this State, and in the interest of humanity, which justice to the present and sympathy for future generations, will not permit you to ignore or evade.



# APPENDIX.

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Since allusion was made in the foregoing report to the obstruction by sand at the mouth of the Mississippi, it may be proper here to state that its great Northwestern branch, the Missouri, and some of its tributaries, traverse immense regions of country, the surface of which is composed of nearly pure sand, so destitute of cementing substance that it is being always washed away and carried into the streams at every high stage of water, thereby shoaling their channels and causing some of them, the Platte notably, to spread out over broad surfaces, and leaving such little depth as to be entirely unnavigable, and this sand is continually drifting on down into the great river, forming bars and obstructions in its channel. But in this State the natural formation of the mountain country which the debris bearing streams flow through, is of a firm character and calculated to resist the action of flood waters to a remarkable degree, and naturally nothing but the finer and fertilizing particles are carried down into the valley, and it is only through the disturbing and disintegrating hydraulic process that this great destruction is rendered possible.

In conclusion, I will add that I am so situated that I have no direct pecuniary interest in this matter, and although the money expended in acquiring the necessary knowledge for this report, and in the republication for public distribution, and the damage sustained by devoting time to it when my own affairs were suffering for want of attention, amounts altogether to what to me is not an inconsiderable sum; yet it is freely given, and I shall think myself amply rewarded if the effort in any measure contributes to the ends of justice and the preservation of the life sustaining resources of the commonwealth. And I here suggest that if gentlemen who are pecuniarily or otherwise interested will spend some time in examining into these matters in those districts, where the exact facts and situation are to be ascertained, they will acquire information which will enable them to act intelligently upon this question, and such study of the subject will enable them to realize as they can in no other manner the magnitude of the impending evil.

M. M. CHIPMAN, M.D.

San Francisco, Sept., 1881.



